

Title: IMAGE FORMING APPARATUS
EMPLOYING ELECTRO-PHOTOGRAPHIC
PROCESS AND CONTROLLING METHOD
OF THE SAME

Inventor(s): Nobuo TOHATA

Appl. No.: 10/806,468

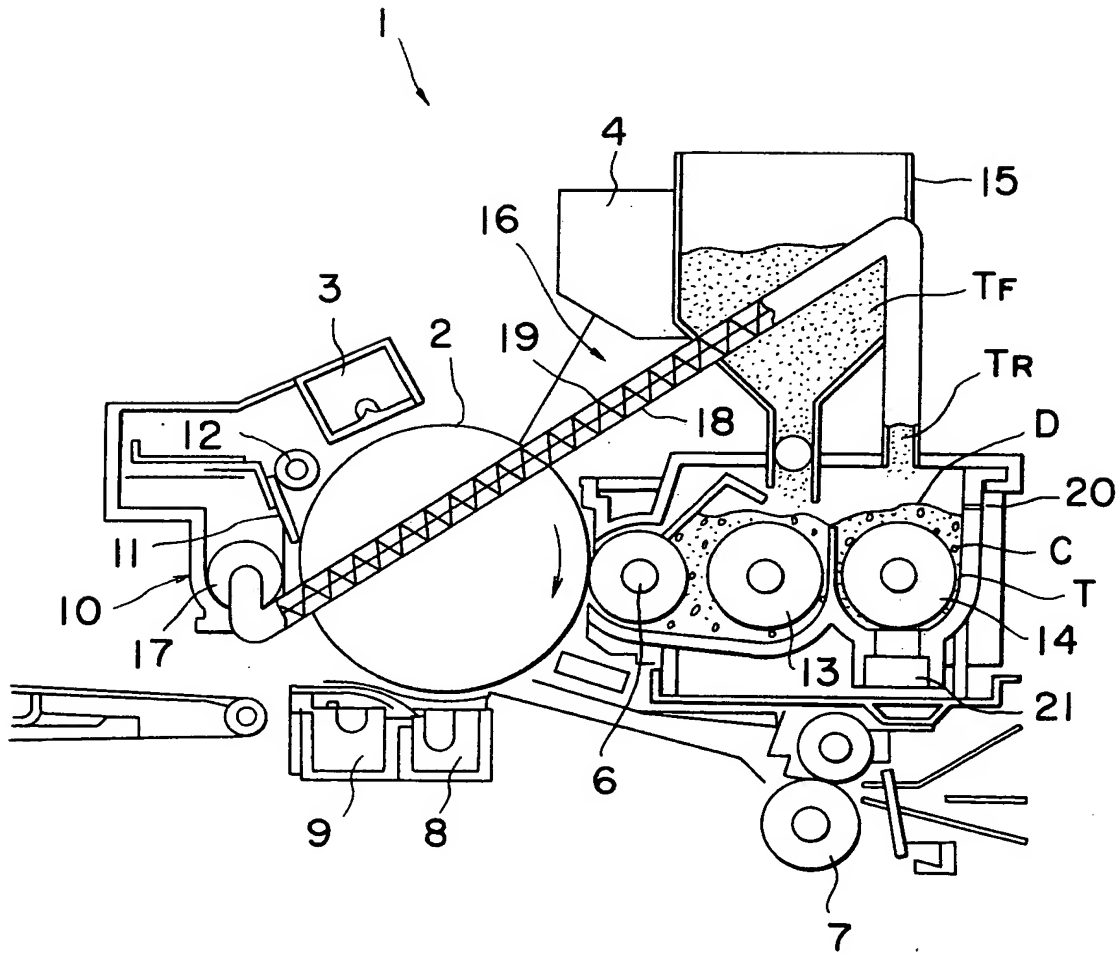


FIG. 1

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| | | grasping of circumstances by sensor | | | image characteristics before control | | |
|------------------|---|-------------------------------------|-----------------------------------|------------------------------|--------------------------------------|------------|---------------|
| | development | developing roller rear side toner | developing device stirring torque | recovered toner level sensor | fog | scattering | image density |
| reference value | | 6.5 | 1.8 | 13 | | | |
| unit | | % | kg·cm | mm (height from bottom) | | | |
| management width | | 6.5±0.5 | 1.4-2.2 | 8-18 | | | |
| embodiment 1 | at the time of stabilization of toner density | 6.5 | 1.8 | 18 | ○ | ○ | ○ |
| embodiment 2 | large quantity of recovered toner supplied | 6.5 | 2.3 | 20 | × | × | ○ |
| embodiment 3 | developer deteriorated | 6.5 | 2.3 | 11 | × | × | ○ |
| embodiment 4 | toner empty | 5.9 | 2.3 | 11 | ○ | ○ | × |

FIG. 2

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| | feedback control method | | | | image characteristics after control | | |
|------------------|-------------------------|--------------|-------------------|----------------------|-------------------------------------|------------|---------------|
| | development bias | waiting mode | developing device | fresh toner supplied | fog | scattering | image density |
| reference value | E | | F | | | | |
| unit | | | | | | | |
| management width | | | | | | | |
| embodiment 1 | E | off | F | off | ○ | ○ | ○ |
| embodiment 2 | E | on | 0.7F | off | ○ | ○ | ○ |
| embodiment 3 | 1.3E | off | F | off | ○ | ○ | ○ |
| embodiment 4 | E | on | F | on | ○ | ○ | ○ |

FIG. 3

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| | | grasping of circumstances by sensor | | | image characteristics before control | | |
|-----------------------|--|-------------------------------------|-----------------------------------|------------------------------|--------------------------------------|------------|---------------|
| | development | developing roller rear side toner | developing device stirring torque | recovered toner level sensor | fog | scattering | image density |
| reference value | | 6.5 | 1.8 | 13 | | | |
| unit | | % | kg·cm | mm (height from bottom) | | | |
| management width | | 6.5±0.5 | 1.4-2.2 | 8-18 | | | |
| comparative example 1 | large quantity of recovered toner supplied | 6.5 | 2.3 | not detected (actually 24) | × | × | ○ |
| comparative example 2 | developer deteriorated | 6.5 | 2.3 | not detected (actually 16) | × | × | ○ |

FIG. 4

| | feedback control method | | | | image characteristics after control | | |
|-----------------------|-------------------------|--------------|-------------------|----------------------|-------------------------------------|------------|---------------|
| | development bias | waiting mode | developing device | fresh toner supplied | fog | scattering | image density |
| reference value | E | | F | | | | |
| unit | | | | | | | |
| management width | | | | | | | |
| comparative example 1 | 1.3E | off | F | off | × | × | ○ |
| comparative example 2 | 1.3E | off | F | off | ○ | ○ | ○ |

FIG. 5